

REMARKS

The Office Action dated July 16, 2002 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto. No new matter is added. Consideration of claims 1-9 is respectfully requested.

The specification is objected for containing informalities. In view of the above amendments to the specification, Applicant requests the withdrawal of the objection.

The Office Action requested that proper drawing corrections be filed. Attached hereto are the proper drawing corrections for Figures 3 and 4.

Claims 1 and 2 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Claims 1 and 2 are amended to more clearly and particularly recite the claimed invention. The amendments to claims 1 and 2 are merely cosmetic in nature and do not narrow the scope of the claims. More specifically, claims 1 and 2 are amended to more clearly recite the structure of the claimed invention. Accordingly, Applicant requests the withdrawal of the rejection of claims 1 and 2.

Claims 1-5, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanoka et. al. (U.S. Patent No. 6,353,042) in view of Yamagishi et. al. (U.S. Patent No. 6,300,556) in view of Asano et. al. (U.S. Patent No. 5,456,764). The Office Action takes the position that the combination of Hanoka, Yamagishi, and Asano teach or suggest all the features recited in claims 1-5, 7, and 8. Applicant respectfully disagrees.

Claim 1 is directed to a solar cell module comprising a front surface side light transmitting member containing at least sodium, a rear surface member, a solar cell element sealed with a sealing resin between the front surface side light transmitting member and the rear surface member. The solar cell element has a semiconductor junction formed with a p-type or n-type crystalline silicon substrate and n-type or p-type semiconductor layer. The crystalline substrate is positioned on a side of the front surface side light transmitting member, and the semiconductor layer is positioned on a side of the rear surface side member.

It is respectfully submitted that the combination of the applied prior art neither teaches nor suggests a solar cell element having a semiconductor junction formed with a p-type or n-type crystalline silicon substrate and n-type or p-type semiconductor layer,

wherein the crystalline substrate is positioned on a side of the front surface side light transmitting member and the semiconductor layer being positioned on a side of the rear surface side member. Also, the applied art neither teaches nor suggests the benefits provided by the non-obvious features of the claimed invention. For instance, the present invention reducing the defects and improves the characteristics of the hetero-junction interface. In addition, the degradation of the power generation performance of the solar cell element can be prevented, thus providing a highly reliable solar cell module capable of withstanding long term use. Thus, it is respectfully submitted that the prior art fails to disclose or suggest the features of the Applicant's invention, and therefore fails to provide the advantages which are provided by the present invention.

Hanoka discloses a solar cell module having crystalline solar cells, wherein light can enter from both sides of the solar cell. However, as admitted in the Office Action, Hanoka does not disclose a front surface member containing at least sodium and a solar cell element having a semiconductor formed with a p-type or n-type crystalline silicon substrate or a n-type or p-type semiconductor layer. Also, Hanoka does not teach or suggest the solar cell element having the semiconductor junction positioned at the crystalline silicon substrate on an opposite side of the front surface side light transmitting member.

Yamagishi discloses a solar cell module using amorphous silicon, in which soda lime glass is used as a substrate for forming the amorphous silicon. However, Yamagishi does not teach or suggest a crystalline solar cell. Also, Yamagishi neither teaches nor suggests that a soda lime glass is used as a glass member disposed above a solar cell through the intermediation of a sealing layer. Also, Yamagishi does not teach or suggest a semiconductor junction formed with a p-type or n-type crystalline silicon substrate and a n-type or p-type semiconductor layer. In contrast, Yamagishi discloses a tin film oxide that is deposited on a glass substrate. Thus, it is submitted that Yamagishi does not cure the deficiencies of Hanoka.

Asano discloses a solar cell with a hetero-junction formed from amorphous silicon and crystalline silicon. The hetero-junction is formed on a light incident side of the crystalline silicon. Although Asano discloses a hetero-junction, Asano does not teach or suggest that the junction is formed with a p-type or n-type crystalline silicon substrate and n-type or p-type semiconductor layer wherein the crystalline substrate is positioned on a

side of the front surface side light transmitting member and the semiconductor layer is positioned on a side of the rear surface side member. Thus, the combination of the references neither teach or suggest all the features recited in claim 1.

Also, it is respectfully submitted that there is no motivation to combine the teachings of Hanoka with Yamagishi and Asano. In other words, one skilled in the art would not combine the teachings of Asano with that of Yamagishi or Hanoka. It is respectfully submitted that one skilled in the art would not combine the teachings of these references to suggest the recited features of the claimed invention. Therefore, Applicant respectfully requests the withdrawal of the rejection of claim 1.

Claims 2-5, 7, and 8 are dependent upon claim 1, therefore these claims for at least the reasons mentioned above, recite features that are neither taught nor suggested by the applied prior art. Accordingly, Applicant respectfully requests the withdrawal of the rejection of claims 2-5, 7, and 8.

Claim 6 is rejected under 35 U.S.C. §103(a), as being unpatentable over Hanoka et al. (U.S. Patent No. 6,353,042) in view of Yamagishi et al. (U.S. Patent No. 6,300,556) and in view of Asano et al. (U.S. Patent 5,456,764), as applied above to claims 1-5, 7 and 8 and further in view of Matsushita et al. (U.S. Patent No. 6,222,118). Applicant respectfully submits that claim 6 recites subject matter that is neither taught nor suggested by the applied prior art.

Matsushita discloses a solar cell element comprising a crystalline silicon substrate. The hetero-junction on the semiconductor layer is formed on a light incident side. In other words, the semiconductor junction is formed with a p-type crystalline silicon substrate and a n-type crystalline layer. However, the hetero-junction is not the same as the recited semiconductor junction. Specifically, the Matsushita does not teach or suggest a crystalline substrate that is positioned on a side of the front surface side light transmitting member and the semiconductor layer is positioned on a side of the rear surface side member. The hetero-junction of Matsushita is formed on the light incident side. Also, Matsushita does cure the deficiencies of Hanoka, Yamagishi, and Asano. Therefore, it is respectfully submitted that claim 6 recites features that are neither taught nor suggested by the applied art. Also, claim 6 is dependent upon claim 1, therefore for at least the reasons mentioned above, claim 6 likewise recites patentable subject matter. Accordingly,

Applicant respectfully requests the withdrawal of the rejection of claim 6.

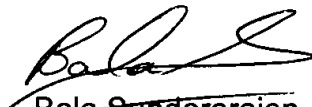
In view of the above amendments and distinctions discussed above, withdrawal of the rejections to claims 1-5, 7 and 8 are respectfully requested. Claims 1 and 2 are amended. No new matter is presented. Therefore, Applicant submits that the application is now in condition for allowance with Claims 1-9 contained therein.

Should the Examiner believe the application is not in condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

In the event this paper is not considered to be timely filed, Applicant respectfully petitions for an appropriate extension of time. The Commissioner is authorized to charge payment for any additional fees which may be required with respect to this paper to Counsel's Deposit Account 01-2300.

Respectfully submitted,

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Enclosure: Marked-up Copy of Specification and Claims
Petition for Extension of Time
Formal drawings of Figures 3 and 4

MARKED-UP COPY OF SPECIFICATION AND CLAIMS

IN THE SPECIFICATION:

Page 11, line 20 to Page 12, line 11:

As shown in Fig. 2, the solar cell element 1 includes an n-type single crystalline silicon substrate 51, an intrinsic amorphous silicon layer 52, and a p-type amorphous silicon layer 53 formed in this order. A transparent electrode 54 on a light receiving side formed of ITO or the like is formed on an entire surface of the p-type amorphous silicon layer 53, and a comb-shaped collector 55 of silver (Ag) or the like is formed on the transparent electrode 54 on a light receiving side. An opposite surface of the substrate 51 has a BSF (Back Surface Field) structure which introduces an internal electric field on the rear surface of the substrate; a high dope n-type amorphous silicon layer 57 is formed with an intrinsic amorphous silicon layer 56 interposed on an opposite surface side of the substrate 51. A transparent electrode 58 on a rear surface side of ITO (Indium Tin Oxide) or the like is formed on an entire surface of the high dope n-type amorphous silicon layer 57, and a comb-shaped collector 59 of silver (Ag) or the like is formed thereon. The rear surface also has a BSF structure which the intrinsic amorphous silicon layer is sandwiched between the crystalline silicon substrate and the high dope amorphous silicon layer in order to reduce defective on the interface and improve characteristics of the hetero junction interface.

IN THE CLAIMS:

1. (Amended) A solar cell module comprising:
 - a front surface side light transmitting member containing at least sodium;
 - a rear surface member;
 - a solar cell element sealed with a sealing resin between the front surface side light transmitting member and the rear surface member, wherein the solar cell element has a semiconductor junction formed with a p-type or n-type crystalline silicon substrate and n-type or p-type semiconductor layer, wherein

the crystalline substrate is positioned on a side of the front surface side light transmitting member, and
the semiconductor layer is positioned on a side of the rear surface side member
[and the solar cell element has the semiconductor junction positioned at the crystalline silicon substrate on an opposite side of the front surface side light transmitting member].

2. (Amended) The solar cell module according to claim 1, wherein the solar cell element is structured so that light enters from a side of the crystalline substrate [opposite of the semiconductor junction].